Space Weather Forecast

Issued on Thursday, 21 July 2022 at 13:16 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1/Minor Storms likely day 2 (22nd) and perhaps day 3 (23rd). Chance of Moderate flares (R1-R2 Radio blackouts) throughout. Potential Earth-directed Coronal Mass Ejection (CME) towards the end of the period - pending analysis.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low over the last 24 hours. There are currently nine active sunspot regions on the visible disc, however most of them are stable with no real magnetic complexity. None of the regions have been significantly active, with only low energy Common-class flares observed. However, a mid level Common-class flare originating from a sunspot near center-disc produced a filament eruption (arc of plasma), which launched a CME (Coronal Mass Ejection), which could potentially be Earth-directed, although awaiting further satellite imagery for analysis. No other Earth-directed CMEs were observed.

Solar Wind / Geomagnetic Activity: The solar wind was indicative of the tail end of a magnetic cloud, following a recent CME arrival (18th). Solar wind speeds constantly declined through the period, from 430 to 370km/s. The magnetic field strength was largely moderate but displayed a rising trend towards the end of the period, with the important north-south component become increasingly unremarkable. The net result of these solar wind measurements was a Quiet geomagnetic activity.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Despite a large number of active regions, activity is expected to remain largely Low with an ongoing chance of isolated M-flares through the period.

Solar Wind / Geomagnetic Activity: Solar winds, initially slow-ambient, are expected to become elevated or perhaps strong in the early UTC hours of day 2 (22nd) under the combined influence of CH01/- and CH02/-, followed by a gradual decline on day 4 (24th). Geomagnetic activity is expected to be Quiet initially, but to become Unsettled and Active with isolated G1/Minor Storm intervals on day 2 (22nd) and perhaps early on day 3 (23rd). Activity easing back to Quiet to Unsettled on day 4 (24th). However, there is the potential for an Earth-directed CME, after the recent filament eruption near centre-disc, which may enhance geomagnetic activity towards the end of the period - pending analysis.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) may increase due to any flares that occur, however there is only a very slight chance of reaching the level of a solar radiation storm.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	60	20	20
Strong	G3	No	1	5	2	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	25	25	25	25
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	2	2	2	2
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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